

A Prototype Design for a 5MW Free Electron Maser with Applications to Plasma Heating*

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A prototype design is presented for a Free Electron Maser capable of producing 5MW long pulse to CW microwave output in the range 130-250 GHz with 50% wall plug efficiency. The design concepts closely follow these for the 1MW device being developed and tested now at the FOM Institute, Rijnhuizen, Netherlands ⁽¹⁾, namely:

- (1) conventional 2MeV DC accelerator system and depressed collector;
- (2) step corrugated waveguide for power handling and beam-RF separation;
- (3) low emittance electron gun with halo suppression;
- (4) step tapered wiggler circuit design
- (5) low current loss solenoid focused beam line
- (6) Brewster Angle output window (Diamond)

Performance predictions are presented with particular attention to beam transmission losses ⁽²⁾ and mode competition. Cost estimates are also presented comparing the cost/kilowatt for the 5MW device with the 1 MW device.

- (1) Urbanus et al, "Design of the 1MW 200 GHz FOM Fusion FEM, Nuclear Instruments and Methods A333 (1993) 235-240 North Holland

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